

Specifications

Drawing No.	UKY1C-H1-14E53-00[37] 1/11
Issued Date.	Dec,26,2014

TO: KED USA

Note: Part Number will be revised in case of specification change.

Product Type	Quartz Crystal
Series	CX2016DB
Frequency	48000kHz
Customer Part Number	-
Customer Specification Number	-
KYOCERA Part Number	CX2016DB48000C0WLLA1
Remarks	Pb-Free, RoHS Compliant, MSL 1

Customer Approval

Approval Signature	Approved Date	
	Department	
	Person in charge	

Seller

KYOCERA Crystal Device Corporation

(Sales Division)

6 Takeda Tobadono-cho, Fushimi-ku, Kyoto

612-8501 Japan

TEL. No. 075-604-3421

FAX. No. 075-604-3469

Manufacturer

Crystal Units Division

5850, Higashine-Koh, Higashine-Shi, Yamagata

999-3701 Japan

TEL. No. 0237-43-5611

FAX. No. 0237-43-5615

Design Department	Quality Assurance	Approved by	Checked by	Issued by
KYOCERA Crystal Device Corporation Crystal Units Engineering Section 1 Crystal Units Division	T. Noritake	K. Yamazaki	T. Nitoube	Y. Kikuchi

Revision History

Rev.No.	Description of revision	Date	Approved by	Checked by	Issued by
1	First Edition	Dec,26,2014	K. Yamazaki	T. Nitoube	Y. Kikuchi

1. APPLICATION

This specification sheet is applied to quartz crystal "CX2016DB48000C0WLLA1"

2. KYOCERA PART NUMBER

CX2016DB48000C0WLLA1

3. RATINGS

Items	SYMB.	Rating	Unit	Remarks
Operating Temperature Range	Topr	-30 to +85	°C	
Storage Temperature Range	Tstg	-40 to +85	°C	

4. CHARACTERISTICS**ELECTRICAL CHARACTERISTICS**

Items	Electrical Specification					Test Condition	Remarks
	SYMB.	Min	Typ.	Max	Unit		
Mode of Vibration		Fundamental					
Nominal Frequency	F0		48		MHz		
Nominal Temperature	T _{NOM}		+25		°C		
Load Capacitance	CL	7.0			pF		
Frequency Tolerance	df/F	-20		+20	PPM	+25±3°C	
Frequency Temperature Characteristics						-30~+85°C	
Frequency drift after reflow						After 2times	
Frequency Ageing Rate						5 years at +25±3°C	
Equivalent Series Resistance	ESR			22	Ω		
Spurious mode series resistance		1100			Ω		±700kHz
Drive Level	Pd	10		100	μW		
Insulation Resistance	IR	500			MΩ	100V(DC)	
Shunt Capacitance	C ₀	0.51	0.71	0.91	pF		
Motional Capacitance	C ₁	2.16	3.16	4.16	fF		
Motional Inductance	L ₁	1.00	3.49	4.00	mH		

5. Measurement Condition

5.1 Frequency measurement

Measuring instrument : PI-Network Test Fixture

Load Capacitance : 7.0pF

Drive Level : 10μW

5.2 Equivalent series resistance (ESR) measurement

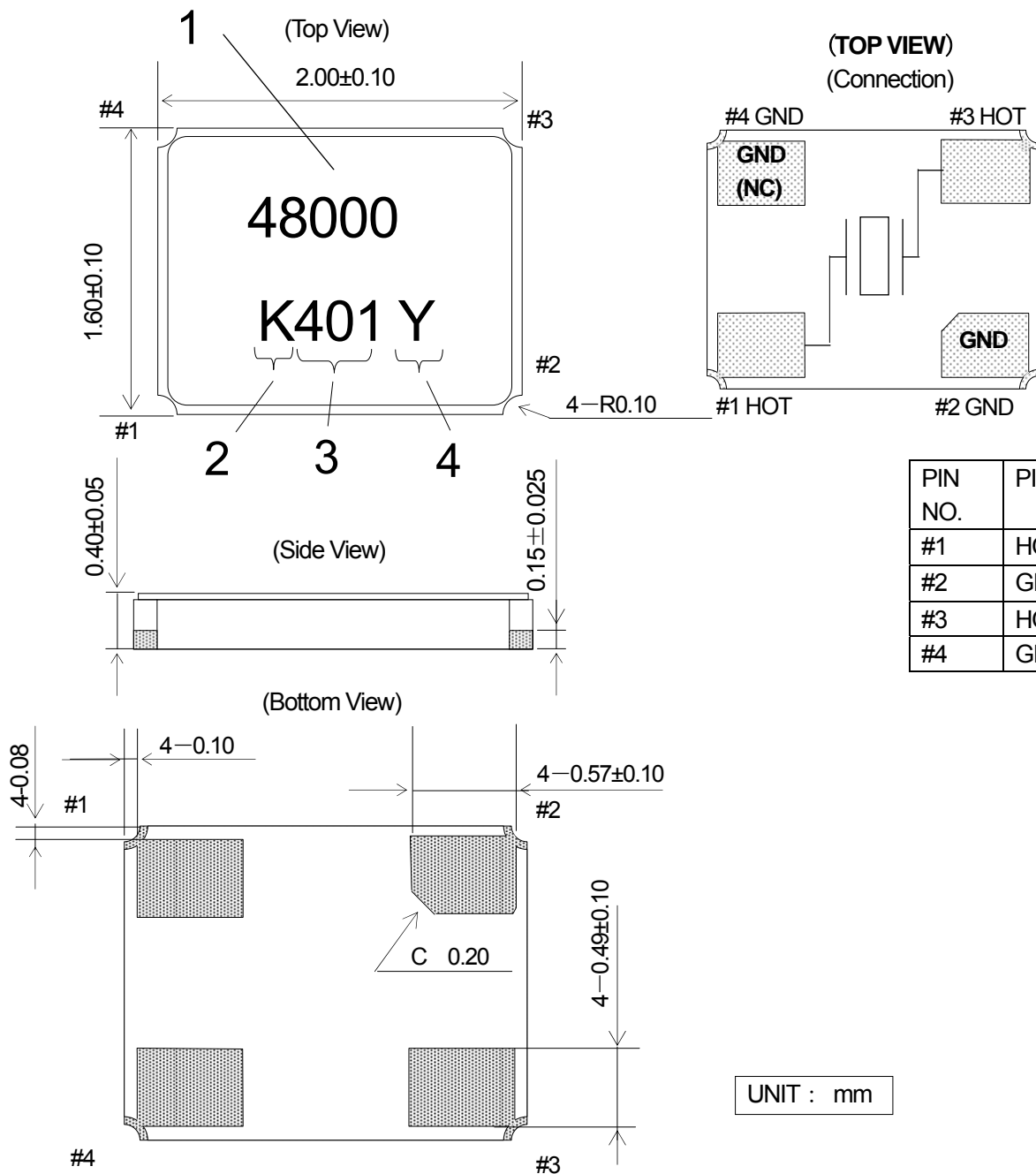
Measuring instrument : PI-Network Test Fixture

Load Capacitance : Series

Drive Level : 10μW

6. APPEARANCES, DIMENSIONS

OUTLINE DIMENSION (not to scale)



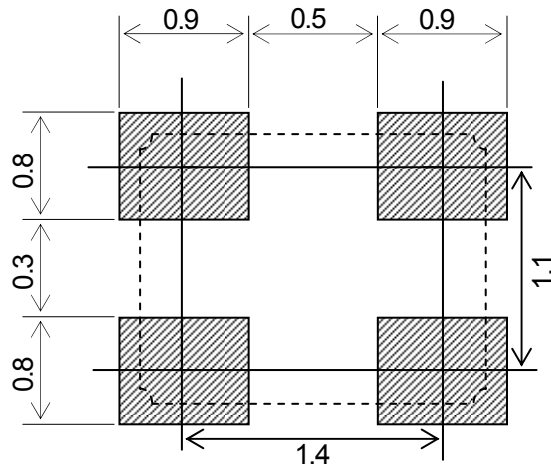
MARKING

1. Nominal Frequency First 5 digit of the frequency is indicated.
2. Identification [K] is to indicate 1Pin direction.
3. Date Code Last 1 Digit of YEAR and WEEK
(Ex) 2014, Jan, 01 → 401
4. Manufacturing Location

Y...Japan (Yamagata)
 Z...Japan (Shiga Yokkaichi)
 T...Thailand
 F...Philippines

※The font of marking is for reference only.

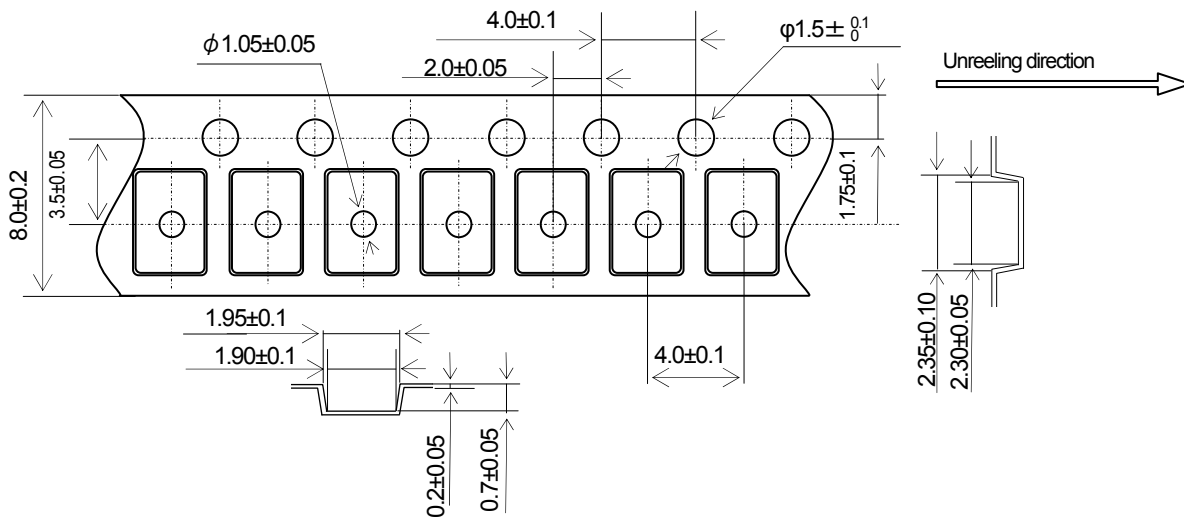
KYOCERA Crystal Device Corporation

7. RECOMMENDED LAND PATTERN (not to scale)

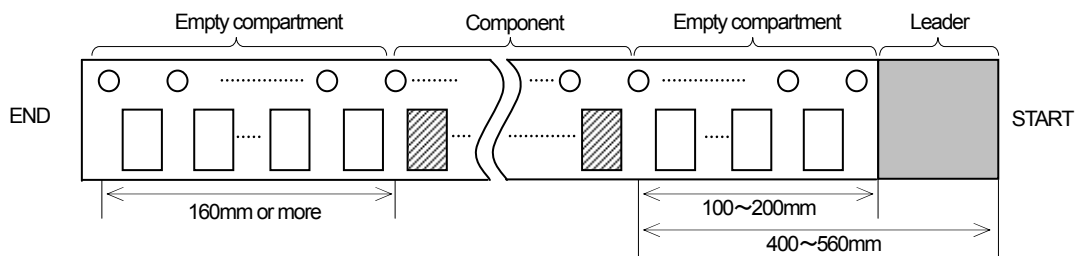
UNIT : mm

8. TAPING&REEL

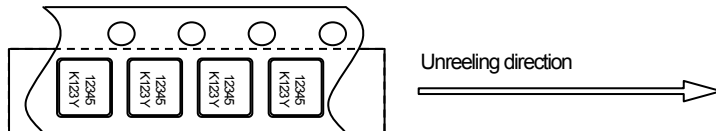
8-1.Dimensions



8-2.Leader and Carrier tape

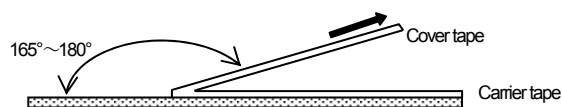


8-3.Direction (Orientation shall be checked from the top cover tape side)

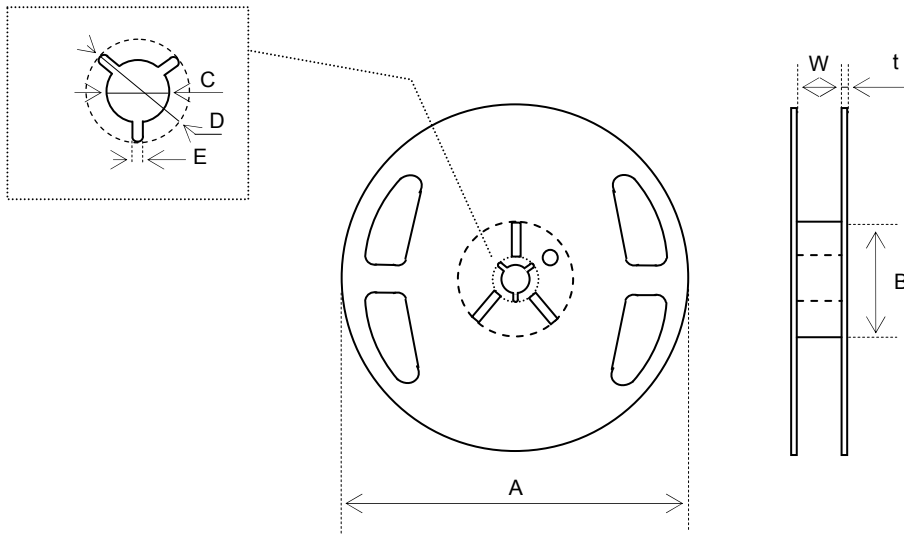


8-4.Specification

1. Material of the carrier tape is either polystyrene or A—PET (ESD).
2. Material of the cover tape is polyester (ESD).
3. The seal tape shall not cover the sprocket holes and not protrude from the carrier tape.
4. Tensile strength of carrier tape: 10N or more.
5. The R of the corner of each cavity is 0.2RMAX.
6. The alignment between centers of the cavity and sprocket hole shall be 0.05mm or less.
7. The orientation shall be checked from the top cover tape side as shown in 8-3.
8. Peeling force of cover tape: 0.1 to 1.0N.
9. The component will fall out naturally when cover tape is removed and set upside down.



8-5.Reel Specification



φ180 Reel (3,000 pcs)

Symbol	A	B	C	D
Dimension	φ180 +0/-3	φ60 +1/-0	φ13±0.2	φ21±0.8
Symbol	E	W	t	
Dimension	2.0±0.5	9±1	2.0±0.5	

(Unit : mm)

3000pcs taping Only

9. Enviromental requirements

After conducting the following tests, component needs to meet below conditions.

Frequency: Fluctuation within $\pm 10 \times 10^{-6}$

CI: Fluctuation within $\pm 20\%$ or 5Ω whichever is larger

- | | | | | | | | | | |
|-----------------------------|--|-----------|--|-----------|--|------------|--------------|-----------|--------------------------------|
| 9.1 Resistance to Shock | <p>Test condition</p> <p>3 times natural drop from 100cm onto hard wooden board.</p> | | | | | | | | |
| 9.2 Resistance to Vibration | <p>Test condition</p> <table border="0" style="margin-left: 40px;"> <tr> <td>frequency</td> <td>: 10 - 55 - 10 Hz</td> </tr> <tr> <td>Amplitude</td> <td>: 1.5mm</td> </tr> <tr> <td>Cycle time</td> <td>: 15 minutes</td> </tr> <tr> <td>Direction</td> <td>: X,Y,Z (3direction), 2h each.</td> </tr> </table> | frequency | : 10 - 55 - 10 Hz | Amplitude | : 1.5mm | Cycle time | : 15 minutes | Direction | : X,Y,Z (3direction), 2h each. |
| frequency | : 10 - 55 - 10 Hz | | | | | | | | |
| Amplitude | : 1.5mm | | | | | | | | |
| Cycle time | : 15 minutes | | | | | | | | |
| Direction | : X,Y,Z (3direction), 2h each. | | | | | | | | |
| 9.3 Resistance to Heat | <p>Test condition</p> <p>The quartz crystal unit shall be stored at a temperature of $+85 \pm 2^\circ\text{C}$ for 500h and subjected to room temperature for 1h before measurement.</p> | | | | | | | | |
| 9.4 Resistance to Cold | <p>Test condition</p> <p>The quartz crystal unit shall be stored at a temperature of $-40 \pm 2^\circ\text{C}$ for 500h and subjected to room temperature for 1h before measurement.</p> | | | | | | | | |
| 9.5 Thermal Shock | <p>Test condition</p> <p>The quartz crystal unit shall be subjected to 500 temperature cycles shown in table below, Then it shall be subjected to room temperature for 1h before measurement.</p> <table border="0" style="margin-left: 40px;"> <tr> <td>Cycle</td> <td>: $-40 \pm 2^\circ\text{C}$ (30min.) \rightarrow $+25 \pm 2^\circ\text{C}$ (5min.)</td> </tr> <tr> <td></td> <td>\rightarrow $+85 \pm 2^\circ\text{C}$ (30min.) \rightarrow $+25 \pm 2^\circ\text{C}$ (5min.)</td> </tr> </table> | Cycle | : $-40 \pm 2^\circ\text{C}$ (30min.) \rightarrow $+25 \pm 2^\circ\text{C}$ (5min.) | | \rightarrow $+85 \pm 2^\circ\text{C}$ (30min.) \rightarrow $+25 \pm 2^\circ\text{C}$ (5min.) | | | | |
| Cycle | : $-40 \pm 2^\circ\text{C}$ (30min.) \rightarrow $+25 \pm 2^\circ\text{C}$ (5min.) | | | | | | | | |
| | \rightarrow $+85 \pm 2^\circ\text{C}$ (30min.) \rightarrow $+25 \pm 2^\circ\text{C}$ (5min.) | | | | | | | | |

9.6 Resistance to Moisture

Test condition

The quartz crystal unit shall be stored at a temperature of $+60 \pm 2^\circ\text{C}$ with relative humidity of 90% to 95% for 240 h. Then it shall be subjected to room temperature for 1h before measurement.

9.7 Soldering condition

1.) Type of solder

Material ... lead free solder paste

Melting point ... $+220 \pm 5^\circ\text{C}$

2.) Reflow temp.profile

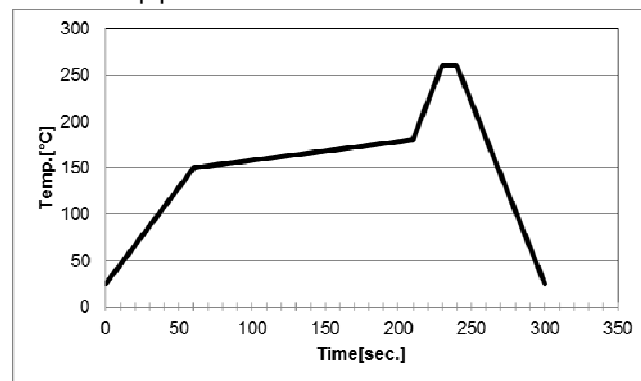
	Temp [$^\circ\text{C}$]	Time[sec]
Preheating	+150 to +180	150 (typ.)
Peak	$+260 \pm 5$	10 (max.)
Total	—	300 (max.)

Frequency shift : $\pm 2\text{ppm}$

3.) Hand Soldering $+350^\circ\text{C}$ 3 sec max

4.) Reflow Times 2 times in below Reflow temp. profile

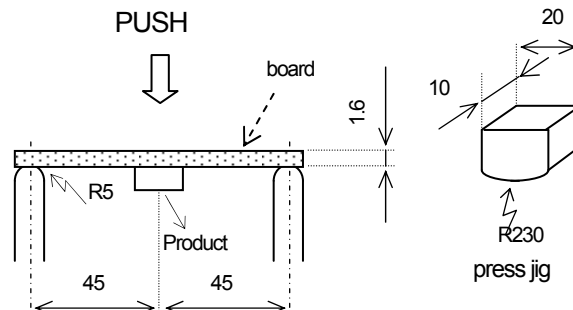
Reflow temp.profile



9.8 Bending Strength

Solder this product in center of the circuit board ($40\text{mm} \times 100\text{mm}$), and add deflection of 3mm.

Test board : $t = 1.6\text{mm}$



UNIT : mm

10. Cautions for use

(1) Soldering upon mounting

There is a possibility to influence product characteristics when Solder paste or conductive glue comes in contact with product lid or surface.

(2) When using mounting machine

Please minimize the shock when using mounting machine to avoid any excess stress to the product.

(3) Conformity of a circuit

We strongly recommend to make sure that Negative resistance (Gain) of IC is designed to be 5 times the ESR (Equivalent Series Resistance) of crystal unit.

11. Storage conditions

Please store product in below conditions, and use within 6 months.

Temperature +18 to +30°C, and Humidity of 20 to 70 % in the packaging condition.

12. Manufacturing location

Kyocera Crystal Device Corporation Plant

Kyocera Crystal Device Corporation Shiga Yohkaichi Plant

Kyocera Crystal Device (Thailand) Co., Ltd

Kyocera Crystal Device Philippines, Inc.

13. Quality Assurance

To be guaranteed by Kyocera Crystal Device Quality Assurance Division

14. Quality guarantee

In case when Kyocera Crystal Device Corporation rooted failure occurred within 1year after its delivery, substitute product will be arranged based on discussion. Quality guarantee of product after 1year of its delivery is waived.

15. Others

In case of any questions or opinions regarding the Specification, please have it in written manner within 45 days after issued date.